



Flooding of North Sea chalk and greensand cores with specific brines

Katika, Konstantina; Alam, Mohammad Monzurul; Chakravarty, Krishna Hara; Xiarchos, Ioannis; Fosbøl, Philip Loldrup; Stenby, Erling Halfdan; Fabricius, Ida Lykke

Publication date:
2017

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Katika, K., Alam, M. M., Chakravarty, K. H., Xiarchos, I., Fosbøl, P. L., Stenby, E. H., & Fabricius, I. L. (2017). *Flooding of North Sea chalk and greensand cores with specific brines*. Poster session presented at 19th European Symposium on Improved Oil Recovery, Stavanger, Norway.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

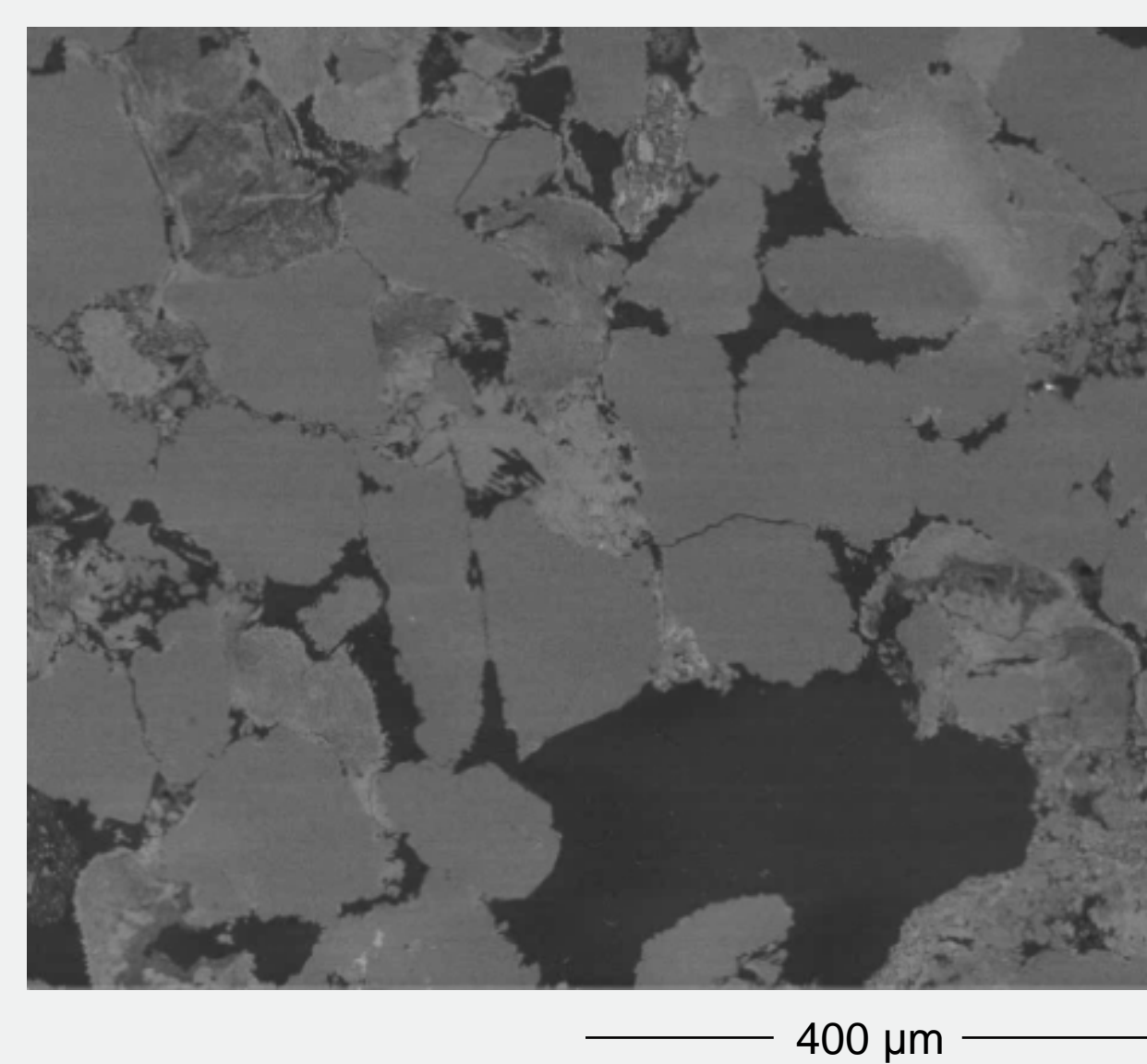
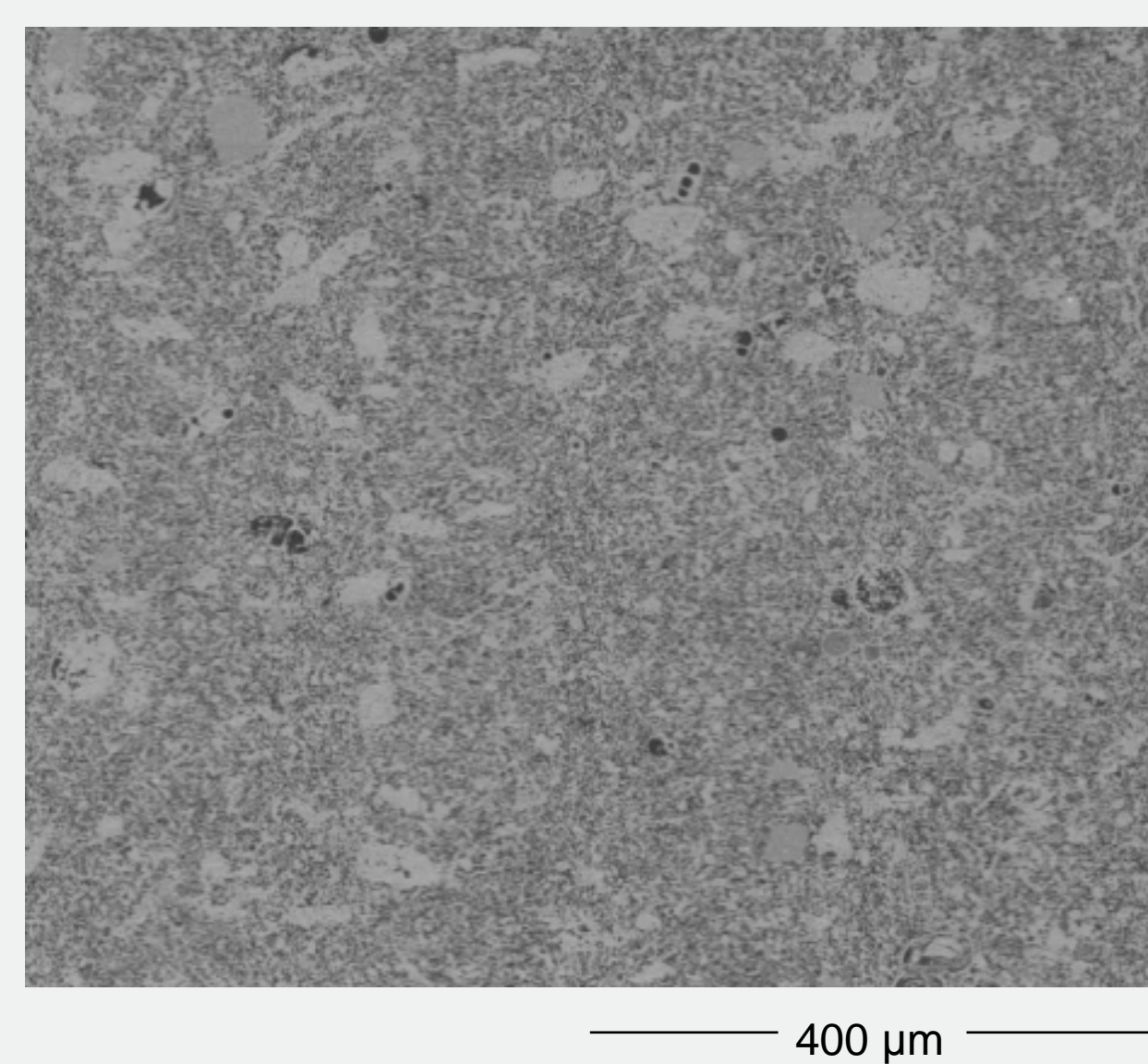
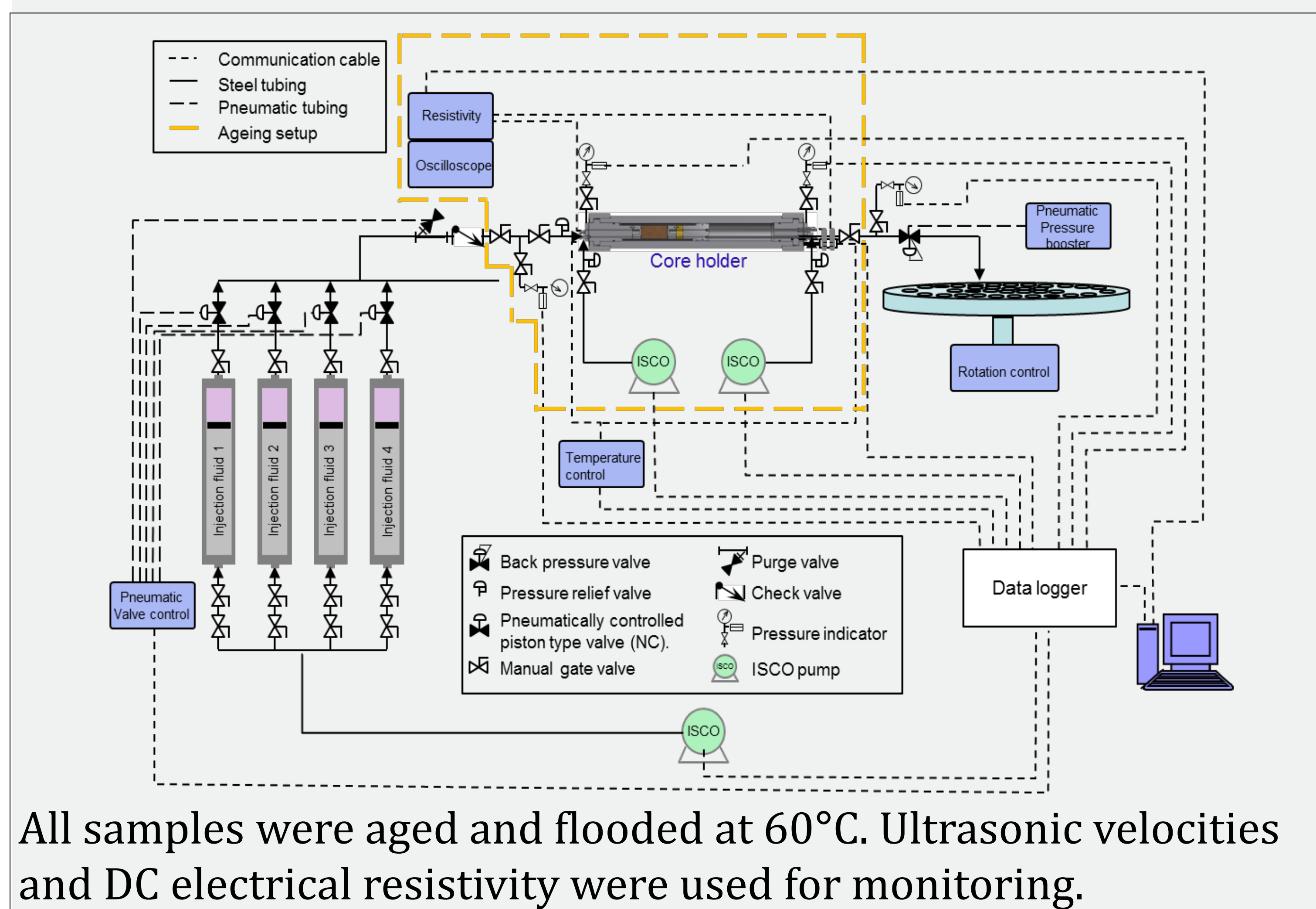
If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Elasticity and Electrical Resistivity of Chalk and Greensand during Smart Water Flooding

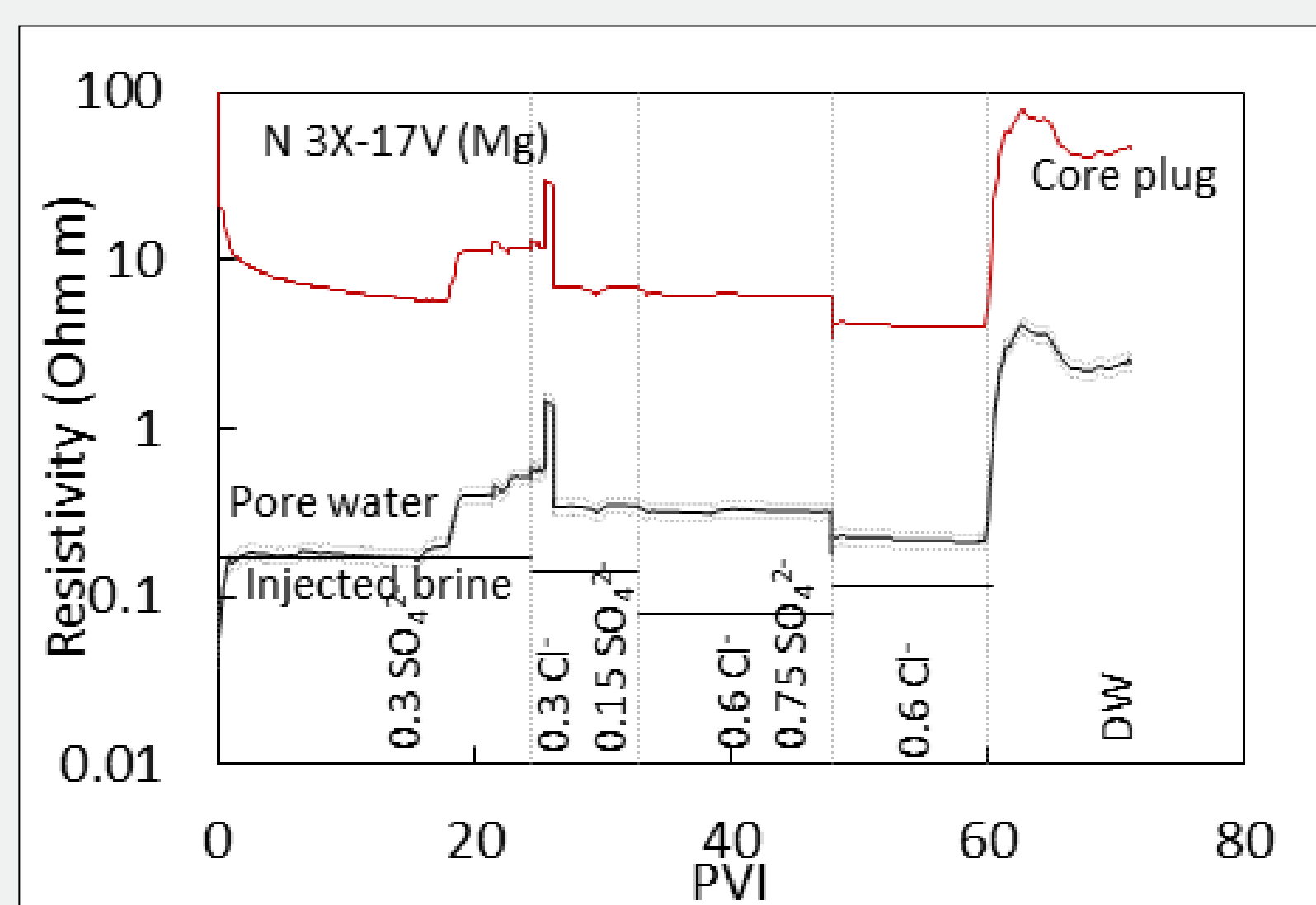
K. Katika, M.M. Alam, K.H. Chakravarty, P.L. Fosbøl, I. Xiarchos, E.H. Stenby, I.L. Fabricius (CERE, Technical University of Denmark)

The authors thank the Danish Energy Agency EUDP 10-II Grant 64011-0009, Mærsk Oil and DONG Energy for funding.

We investigate the physical processes on a pore scale that are responsible for changes in petrophysical and mechanical properties of four oil-bearing chalk and four oil-bearing greensand samples caused by flooding with brines containing varying amounts of dissolved NaCl, Na₂SO₄, MgCl₂ and MgSO₄.

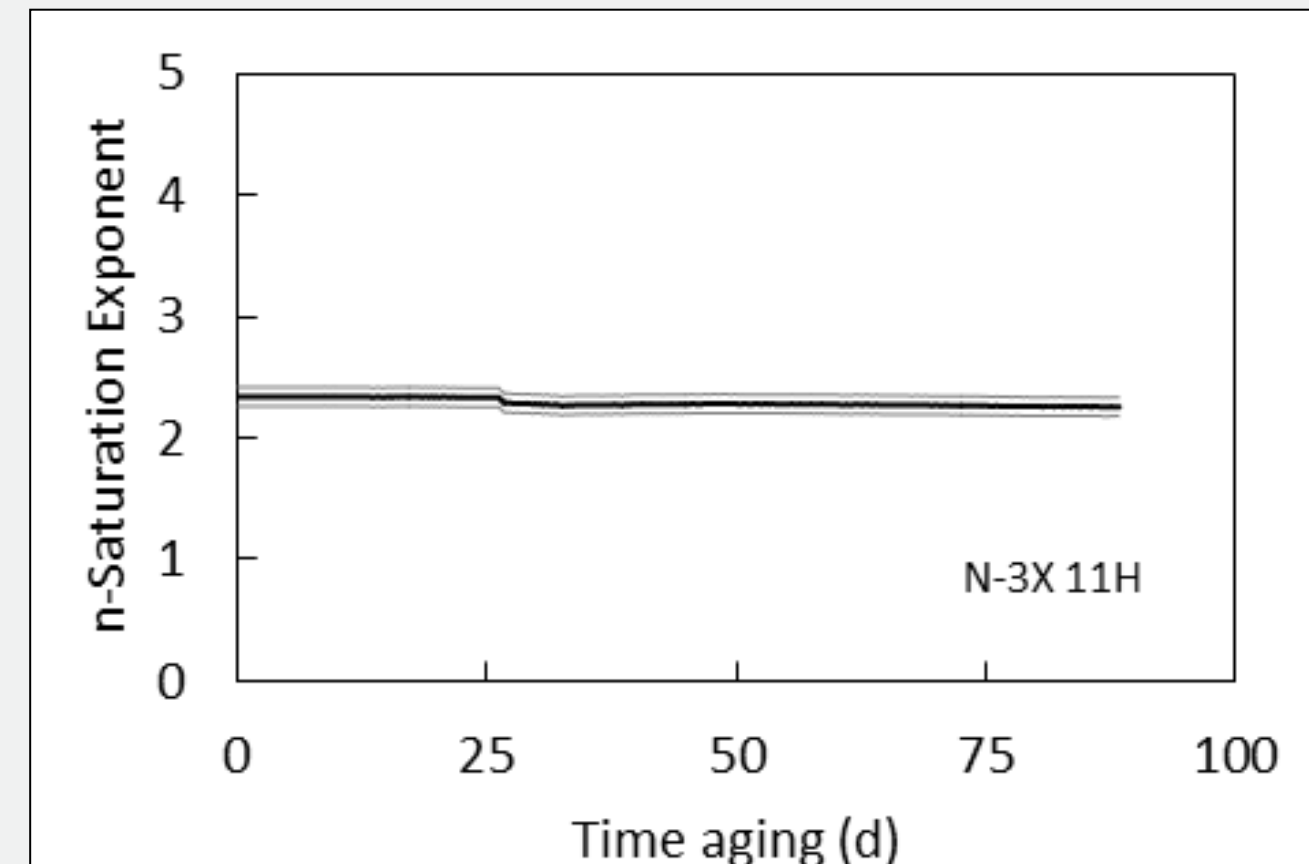


All samples are from the Danish North Sea. Chalk samples are from the Upper Cretaceous of the Gorm field. The greensand samples are from the Paleocene Solsort field.

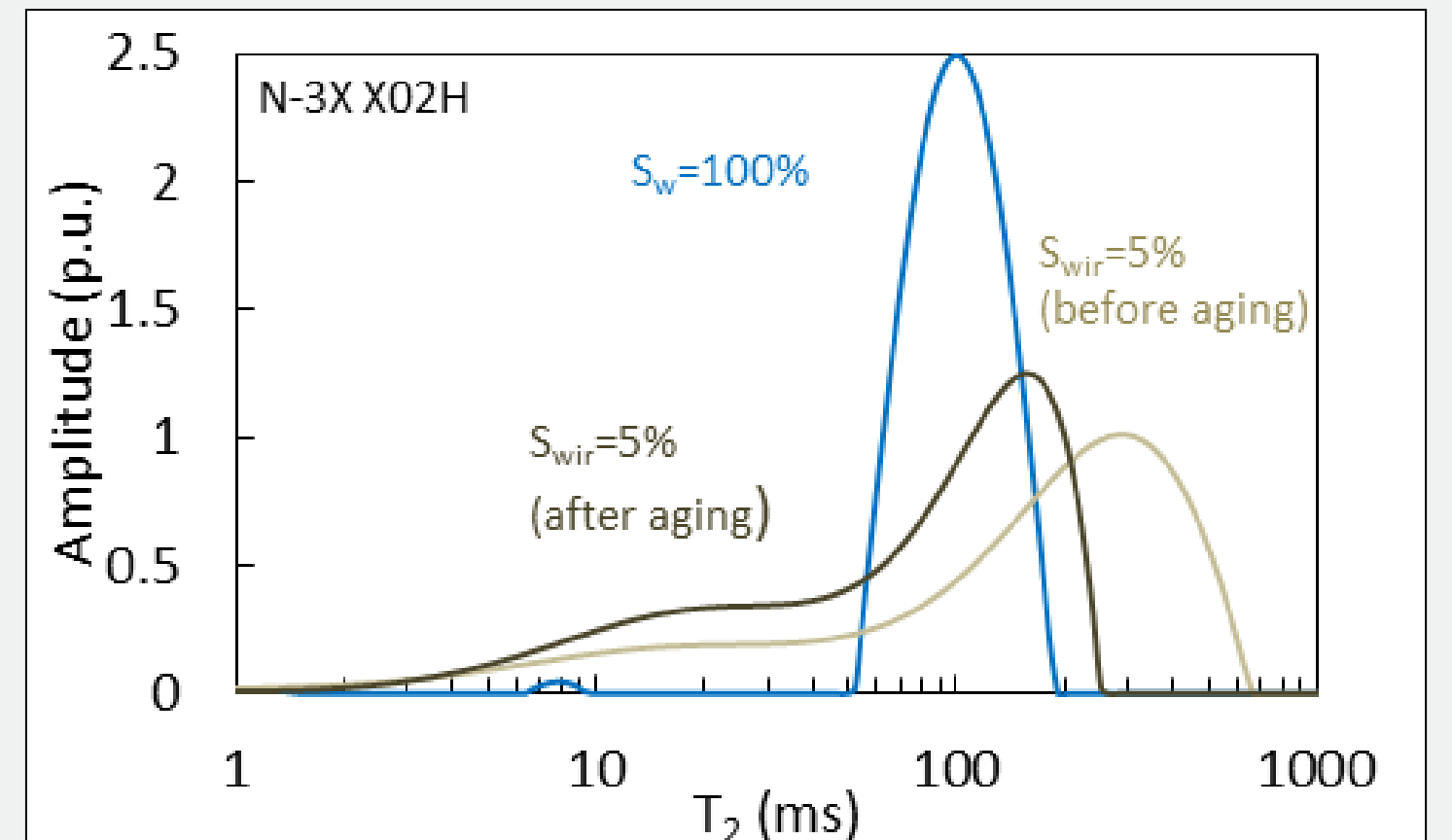


The electrical resistivity data during flooding revealed that the formation brine is not fully replaced by the injected water in both chalk and greensand.

Most chalk samples remain water wet

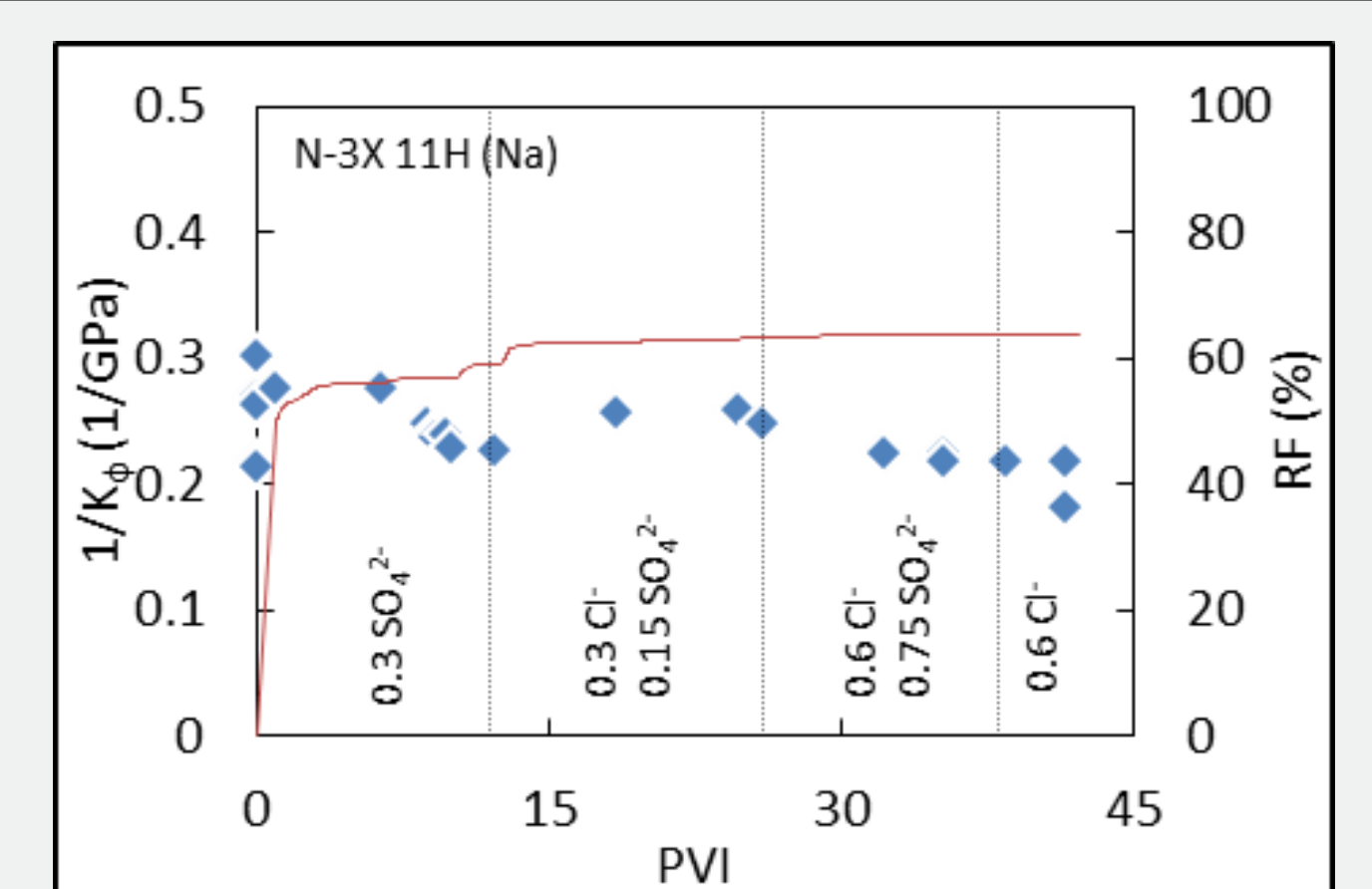
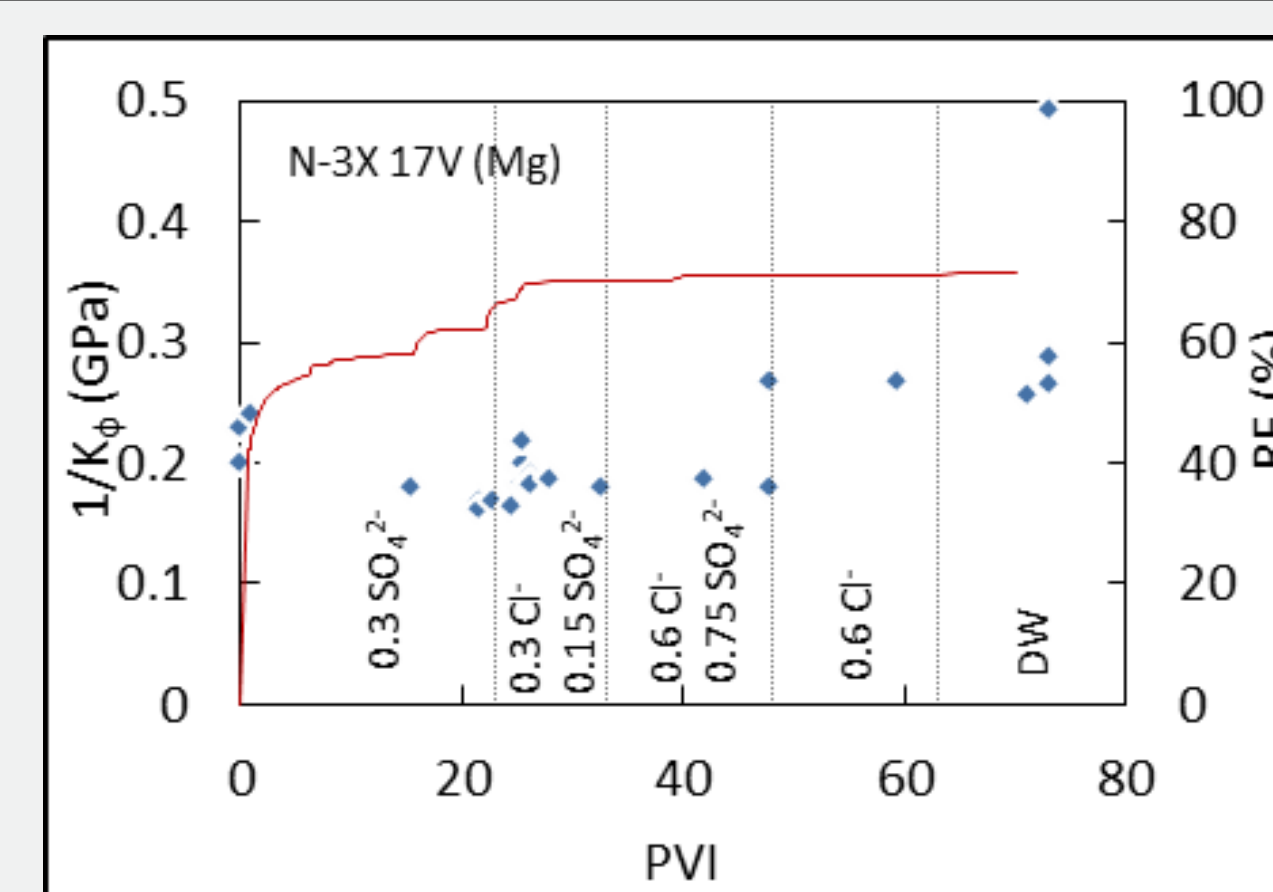


This chalk sample ages to more oil wet



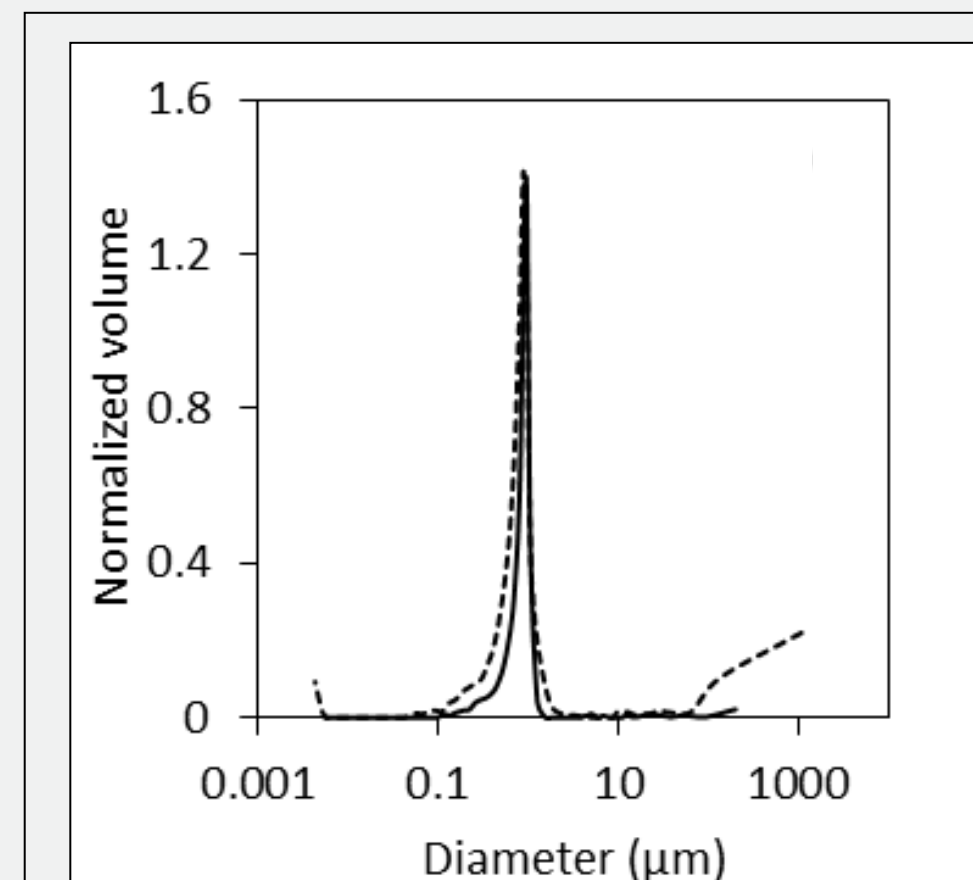
Chalk: Wettability effects?

Electrical resistivity data and NMR indicate that chalk is water wet upon saturation to S_{wir} , but that aging in some cases lead to a wettability change to less water wet conditions (this can be a consequence of the evaporation method used for saturation). Upon flooding all samples regained their water wetness.



Chalk: Pore compressibility increase?

Changes in the elasticity of chalk during flooding illustrate the water softening effect of magnesium bearing brines as compared to the sodium bearing brines.



Chalk: Fines Formation?

Fines formation caused by chemical precipitation during flooding of chalk might be inferred from increase in specific surface and a shift to lower average throat diameter by MICP.

What about the Greensand? -nothing happened:

Electrical resistivity and NMR data indicate that **greensand remained mixed wet** during aging and flooding. **Stiffness of greensand was not affected** by the smart water flooding as determined from the elastic wave measurements. **No indication of fines formation** was observed for greensand.